**IN THE CLAIMS**:

1. (currently amended) A reactor for hydrotreating, which comprises at least four catalyst layers packed respectively with hydrotreating catalysts, with said layers satisfying the relationship represented by the following formulae:

$$S_n \leq S_{n+1} \qquad (1)$$

$$1.15V_n > V_{n+1} \qquad (2)$$

wherein S represents the surface area per cubic meter of each hydrotreating catalyst layer; V represents the pore volume per cubic meter of each catalyst layer; and wherein n is a natural number representing the order of each catalyst layer, and with an amount of the catalyst packed into each catalyst layer being 3 to 70% by volume based on the total amount of the catalysts packed into the reactor.

2. (original) The reactor according to claim 1, wherein the reactor comprises 4 to 20 catalyst layers.

3. (original) The reactor according to claim 1, wherein the reactor comprises 5 to 15 catalyst layers.

4. (canceled)

5. (original) The reactor according to claim 1, wherein the hydrotreating catalysts contain a hydrogenation activating metal and a carrier of a porous inorganic oxide supporting the metal.

6. (original) The reactor according to claim 5, wherein the hydrogenation activating metal is at least one member selected from the group consisting of group IB metals, group VB metals, group VIB metals and group VIII metals.

7. (original) The reactor according to claim 5, wherein the hydrogenation activating metal is at least one member selected from the group consisting of cobalt, molybdenum, nickel and tungsten.

8. (original) The reactor according to claim 5, wherein the porous inorganic oxide is at least one member selected from the group consisting of alumina, silica, titania, zirconia, magnesia,

alumina-silica, alumina-boria, alumina-titania, alumina-zirconia, alumina-magnesia, alumina-silica-zirconia, alumina-silica-titania, zeolites, sepiolite and montmorillonite.

9. (original) The reactor according to claim 5, wherein an amount of the hydrogenation activating metal supported is 1 to 40% by mass based on the total amount of the catalyst.

10. (currently amended) A process for producing an ultralow sulfur heavy oil, which comprises using a reactor for hydrotreating which contains at least four catalyst layers packed respectively with hydrotreating catalysts, with said layers satisfying the relationship represented by the following formulae:

$$S_n \leq S_{n+1} \qquad (1)$$

$$1.15V_n \geq V_{n+1} \qquad (2)$$

wherein S represents the surface area per cubic meter of each hydrotreating catalyst layer; V represents the pore volume per cubic meter of each catalyst layer; and wherein n is a natural number representing the order of each catalyst layer, and with an amount of the catalyst packed into each catalyst layer being 3 to

70% by volume based on the total amount of the catalysts packed into the reactor, and passing a heavy oil through the first to the last catalyst layers successively to thereby bring the heavy oil into contact with hydrogen gas under hydrogenation conditions in each catalyst layer.

11. (original) The process according to claim 10, wherein the reactor comprises 4 to 20 catalyst layers.

12. (original) The process according to claim 10, wherein the hydrogenation conditions include the reaction temperatures of 300 to 480 °C.

13. (original) The process according to claim 10, wherein the partial pressures of hydrogen at the inlet of the reactor range from 1.0 to 25.0 MPa.

14. (original) The process according to claim 10, wherein the hydrogen/oil ratios at the inlet of the reactor range from 100 to 2000 $Nm^3/m^3$.

15. (previously added) The reactor according to claim 1 , wherein the reactor further comprises in spaces among catalyst beds a nozzle for feeding a quenching oil or a quenching gas for temperature control of the reactor.

16. (previously added) The process according to claim 10, wherein the process further comprises feeding a quenching oil or a quenching gas for temperature control of the reactor into spaces among catalyst beds.

17. (previously added) The process according to claim 10, wherein the first to the last catalyst layers are separately packed into a plurality of reactors, respectively.

18. (previously added) The process according to claim 10, wherein the contact of a heavy oil with hydrogen gas is conducted by a method selected from the group consisting of a cocurrent descending flow method, a cocurrent ascending flow method and a countercurrent method.

19. (new) The reactor according to claim 5, wherein the porous inorganic oxide is at least one member selected from the group consisting of silica, titania, zirconia, magnesia, alumina-silica, alumina-boria, alumina-titania, alumina-zirconia, alumina-magnesia, alumina-silica-zirconia, alumina-silica-titania, zeolites, sepiolite and montmorillonite.

20. (new) The process according to claim 10, wherein the hydrotreating catalysts contain a hydrogenation activating metal and a carrier of a porous inorganic oxide supporting the metal and wherein the porous inorganic oxide is at least one member selected from the group consisting of silica, titania, zirconia, magnesia, alumina-silica, alumina-boria, alumina-titania, alumina-zirconia, alumina-magnesia, alumina-silica-zirconia, alumina-silica-titania, zeolites, sepiolite and montmorillonite.

21. (new) The reactor according to claim 1, wherein the reactor comprises at least six catalyst layers packed respectively with hydrotreating catalysts.

22. (new) The process according to claim 10, wherein the reactor comprises at least six catalyst layers packed respectively with hydrotreating catalysts.